

## Comic Shader

Comic shader is a NPR shader that is supported by SRP. It has two main options simple and stylistic. Stylistic has more color options for model and shadow colors to tweak.

### What can you achieve with this Comic Shader;



- You can make materials with crosshatch and halftone shading effects,
- Change the color of shadows, and change color of material with mask,
- Have a little more control over shadows and shadow intensity,

Comic Shader;

- comic shader made to be a simple and practical shader, and it is built on unity standard specular shader by removing lots of features and adding some custom features. Please don't expect it to work for every lighting scenario and it changes some behavior of lights.
- supports directional lights, point lights, spot lights and GI, shadows may act off after shadow colors has changed. Also **only works with real time lighting**.
- needs a shadow weight texture (an intense and banded AO map) for best results.
- accepts normal map but normal map may not add much to material definition depending on your settings.
- package contains a post process effect for out liner as an extra tool (which I can't offer support for it), you may find more information about this at <https://roystan.net/articles/outline-shader.html> .
- package contains halftone and crosshatch tonal maps (you can add your custom tonal maps for other shadow textures). For more information <https://sites.google.com/site/cs7490finalrealtimehatching/>

## **Shader Quirks;**

UV rotation;

Because this shader uses shadow textures, it is good to keep this in mind while UV unwrapping a model. Inconsistent rotation of UV islands or stretching areas may cause disruption for shadows.

Stylized Shadow Colors;

Stylized shadows are something to be careful with it, they may create lighting-shadow bugs.

Stylized Light Colors;

Stylized light color settings works by shifting colors, this also effects specular lighting from point/spot light. It may be hard to grasp and be inconsistent.

Point and Spot lights;

Point and spot lights works only as specular effects, they don't really lighten materials. They paint over objects with their colors (shifted colors if Stylistic is toggled).

Global illumination;

May not work as expected, usually adds a diffuse light to objects.

## **Material properties;**

Stylistic toggle = Change how shadows work, adds more options for colors and shadows colors.

Normal toggle = opens normal map slot.

Main; contains albedo, emission color and normal map when enabled.

Shadow Mask = white areas are always albedo color.

Shadow Weight = multiplied by light and shadow. It is an intense AO map to guide shadows to better suit your NPR style.

Shadow multiplayer = Self explanatory.

Black threshold = black threshold of Shadow Weight map.

White threshold = white threshold of Shadow Weight map.

Shadow Contrast = Contrast of Shadow Weight map.

Color Options = enabled with Stylistic Toggle.

ColorShiftMask = mask for changing colors and shadow colors of same material adding it enables second color change and shadow color change.

Skin Color / Skin Color Value = Soft light color and multiplayer

Cloth Color / Cloth Color Value = Soft light color and multiplayer

Skin Shadow Color Settings = Shifts shadow color

Cloth Shadow Color Settings = Shifts shadow color

Smoothness = Works like regular smoothness range can be used by itself or as multiplayer for texture

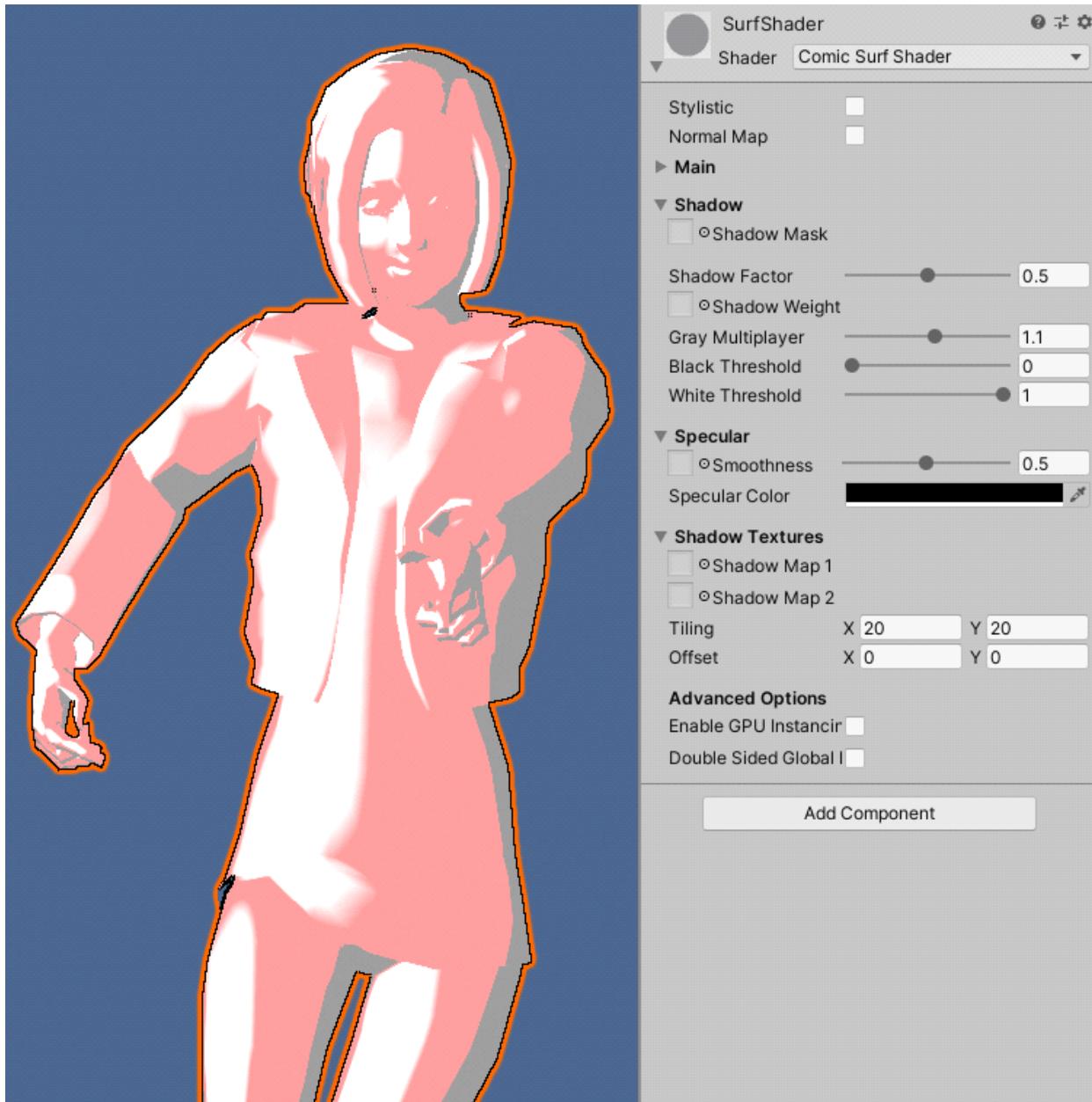
Specular Color = Works like usual specular Color

Shadow Textures = textures of shadows, RGB channels are used for different shadow-light intensities

Tiling And Offset = Tiling and offset of shadow textures

## Material Example:

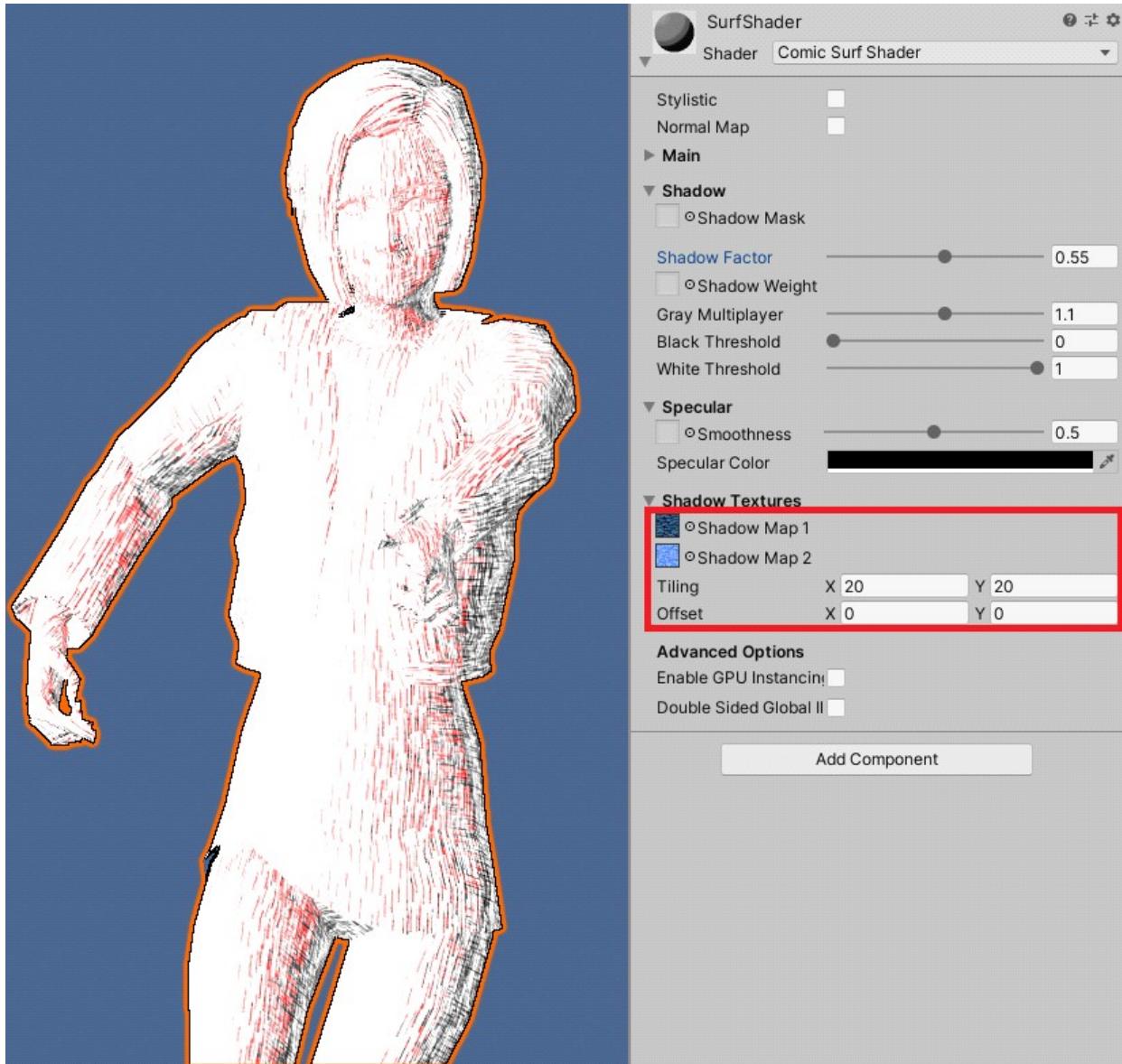
In an environment with directional light and a red point light. Material without any properties looks like this. Red point light, colors where it hits.



## Shadow Maps

To get textured shadow look, you can add half-tone or crosshatch shadow maps to Shadow Map1 and Shadow Map2. Blacker texture goes to 1 and whiter texture one goes to 2. If it is wrong you will get darker lightened areas and lighter dark areas.

You can change the scale of texture from Tiling option to get a result that satisfies you. Lasly you can slide texture with Offset value.



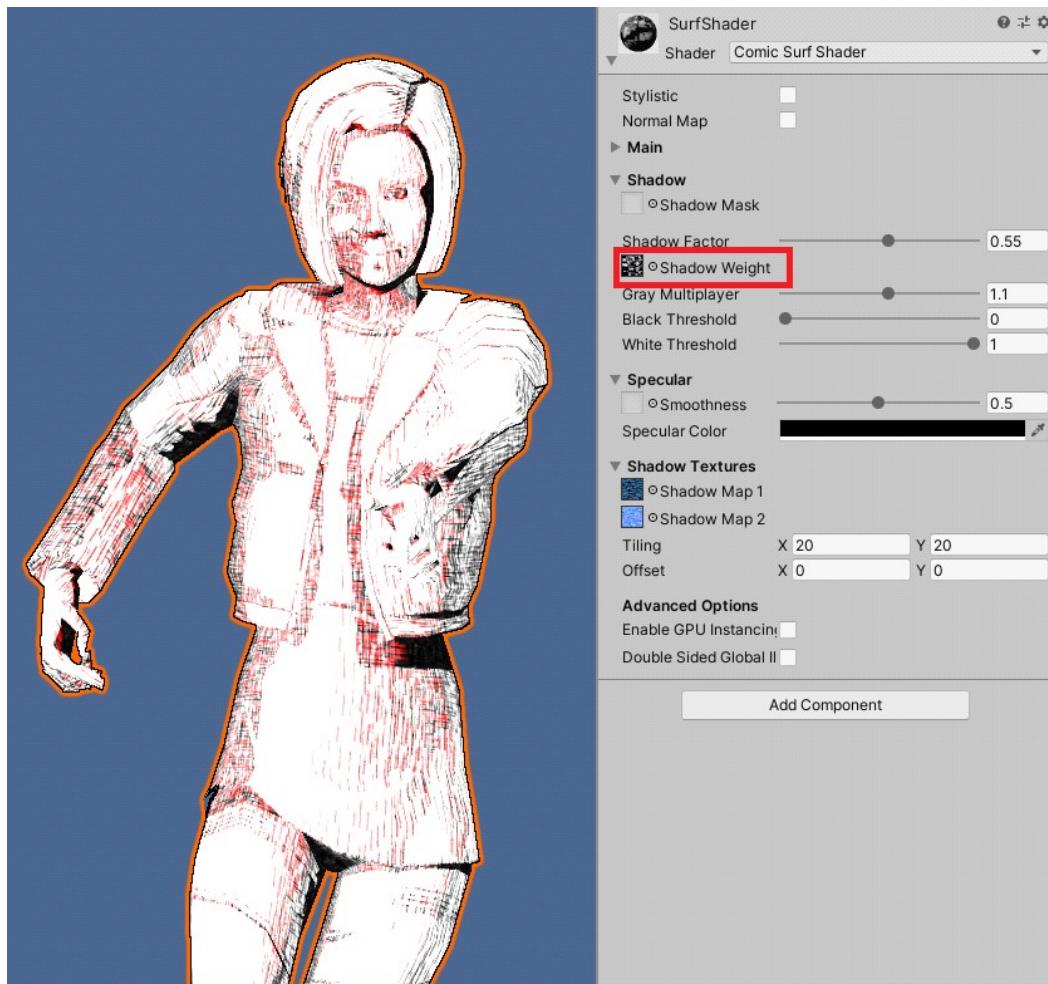
## Shadow Weight (Texture)

Now let's add a Shadow Weight texture to get better shadowing.

This is what my shadow map looks like. Usually you would like something like an exaggerated and banded ambient occlusion map. Please note that, this shadow map emphasis light coming from one side. It may be a bad idea to do a sided shadow map like this for your own project.



Shadow weight is optional but strongly recommended , you may think it as an exaggerated ambient occlusion map. It prevents lightning errors and defines the form of the object so much better.

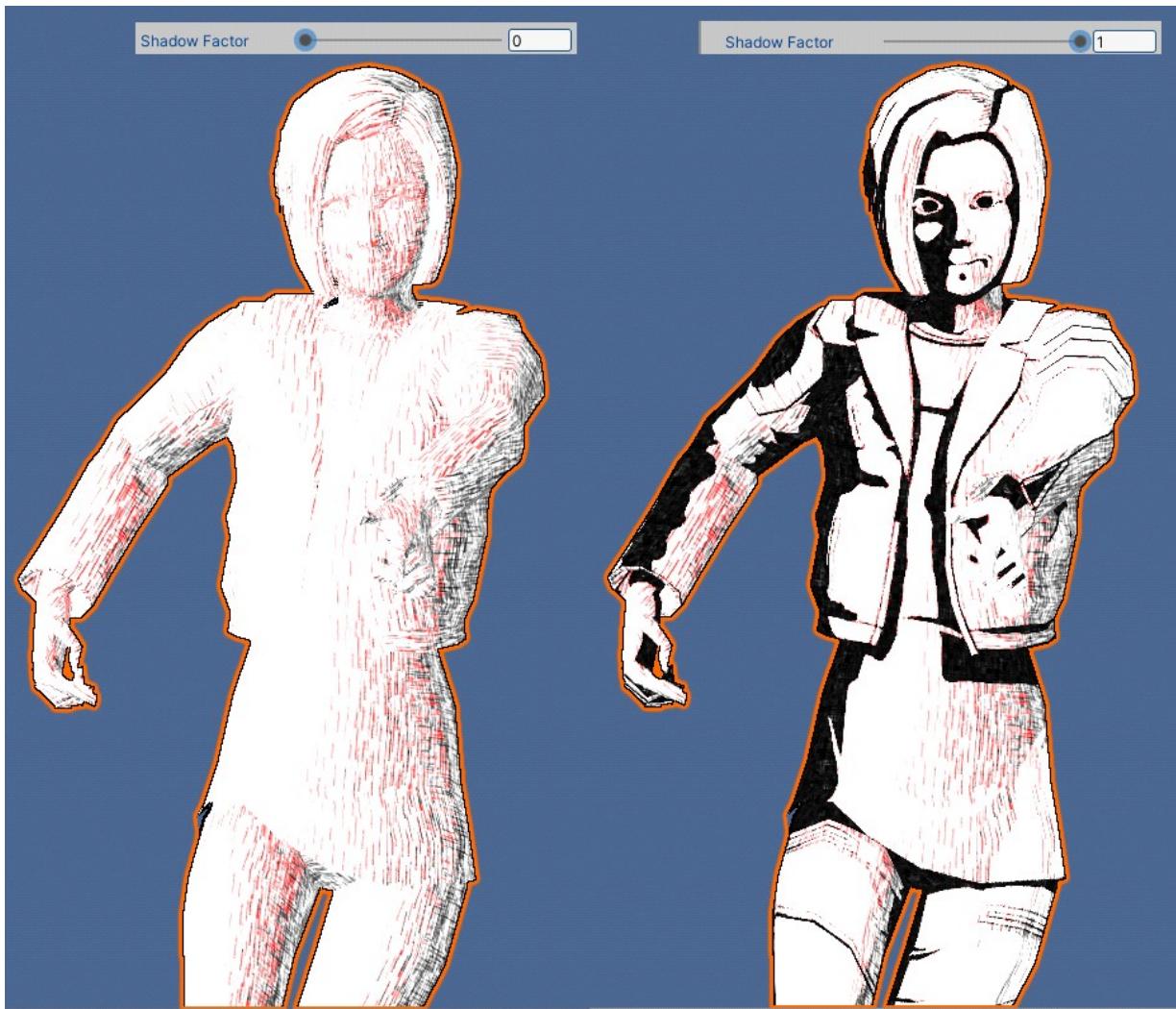


## **Shadow Weight Factor**

Shadow Weight Factor controls how much scene light effects end shadow versus how much Shadow Weight texture effects end shadow.

When Shadow Weight Factor is 1, only texture effects end shadow.

When Shadow Weight Factor is 0, only scene lighting effects end shadow.



Let's keep Shadow Weight Factor 1 and close red light for now to see other slider effects better.

## Shadow Weight Texture Sliders

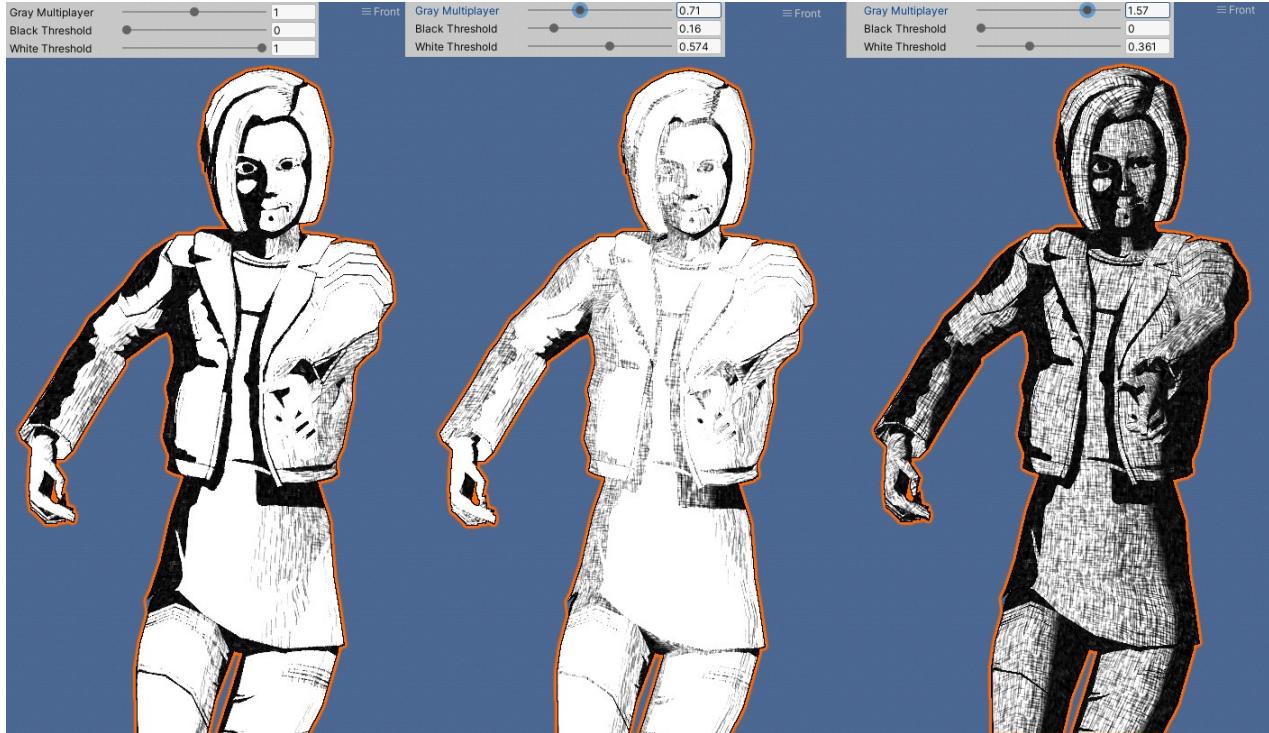
Sliders under Shadow Weight affects your shadow weight texture. They are made to be able to make quick changes to the texture, without remaking or changing it in another program.

As Black Threshold increase; blackest areas start to get whiter.

As White Threshold increase; whitest areas start to get blacker.

Gray Multiplayer will multiply gray values of the texture making gray values lighter or darker.

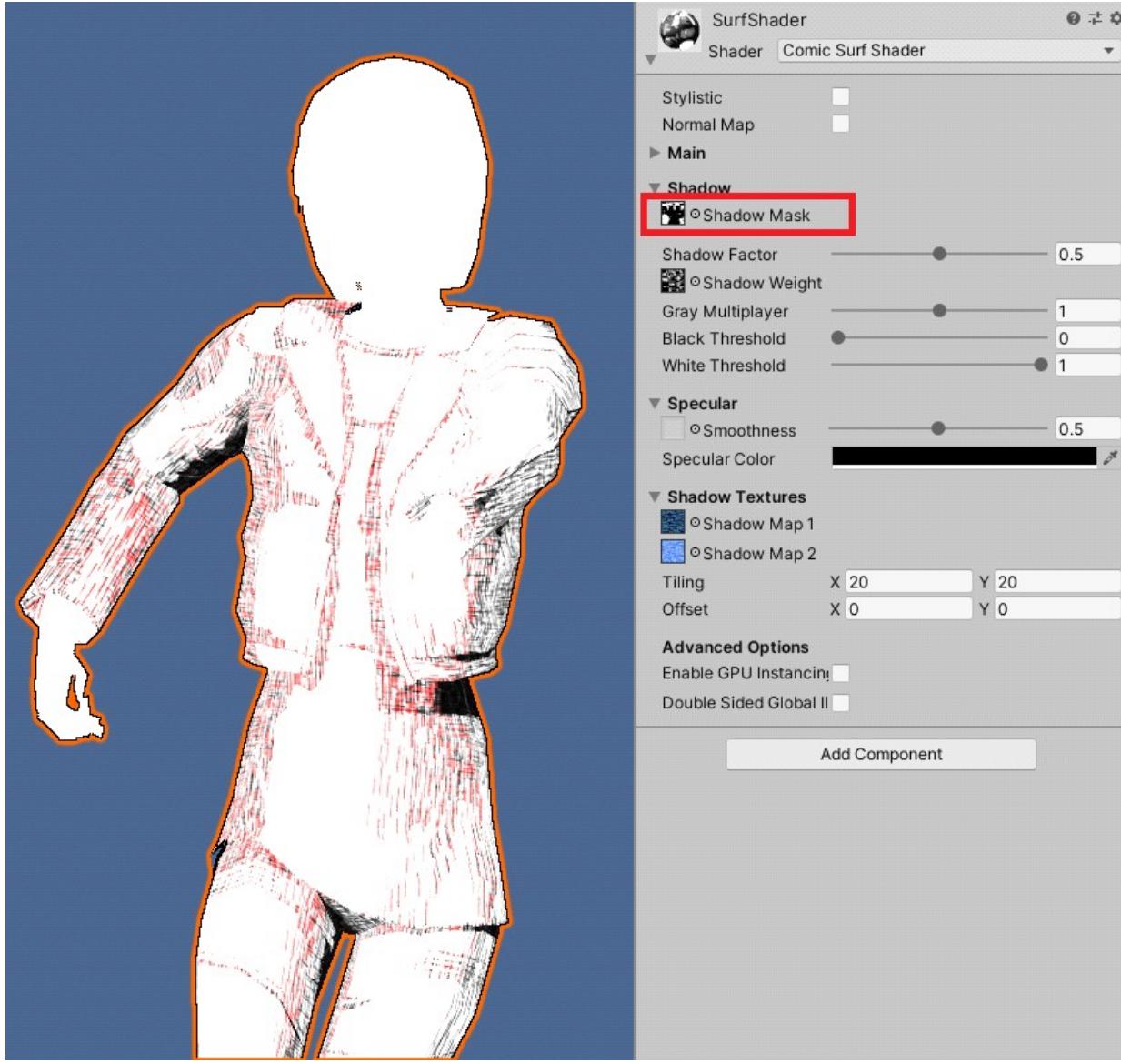
A few examples;



## Shadow Mask

Shadow Mask lets user put another texture to mask all shadows in that area (ex. eyes). White areas get masked.

ex. Skin hair and eyes masked this way.

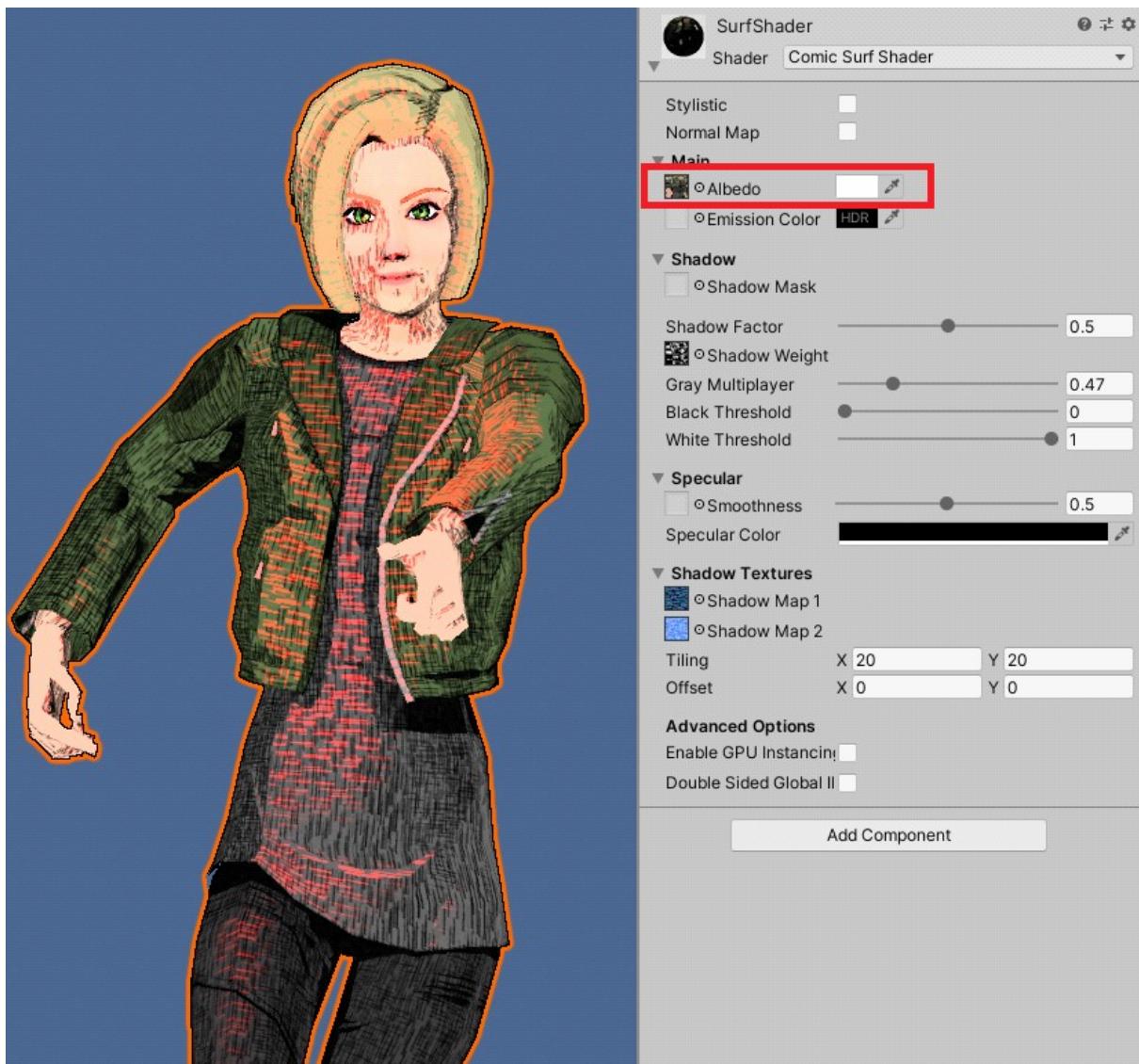


I will remove this mask again before continue.

## Albedo Map

Before moving on let's add an Albedo map. Specular light doesn't work well on white surfaces. In this shader;

- When light reflects off a white object reflectance is still white since white is maximum color value.
- When albedo color changes, it also effects shadows and lighting. So you may need to tweak shadow after putting albedo map.
- A side note normal map slot opens when you check Normal Map box and it works as expected.
- Another side note is, you can use Emission Color as a texture slot or a mask slot but you need to give it a color or make it white, it doesn't work as black.



Notice that my gray multiplier value is half now in same settings.  
I also turned intensity down on red point light too.

## Smoothness and Specularity

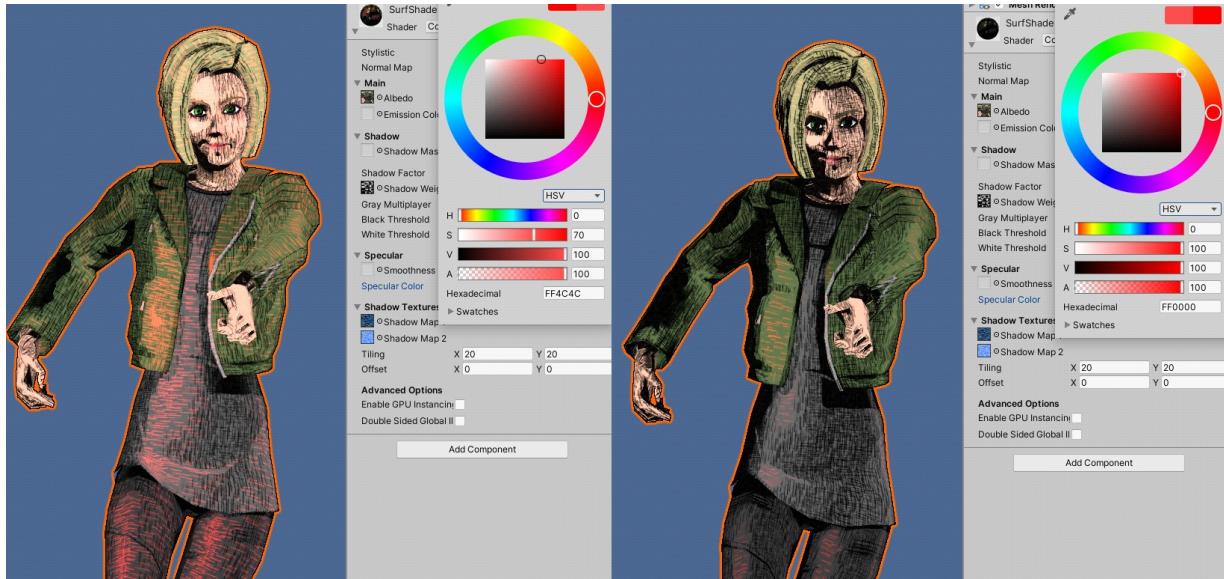
Smoothness and Specular Color works like Standard Specular Unity shader materials.

Three things are different for comic shader;

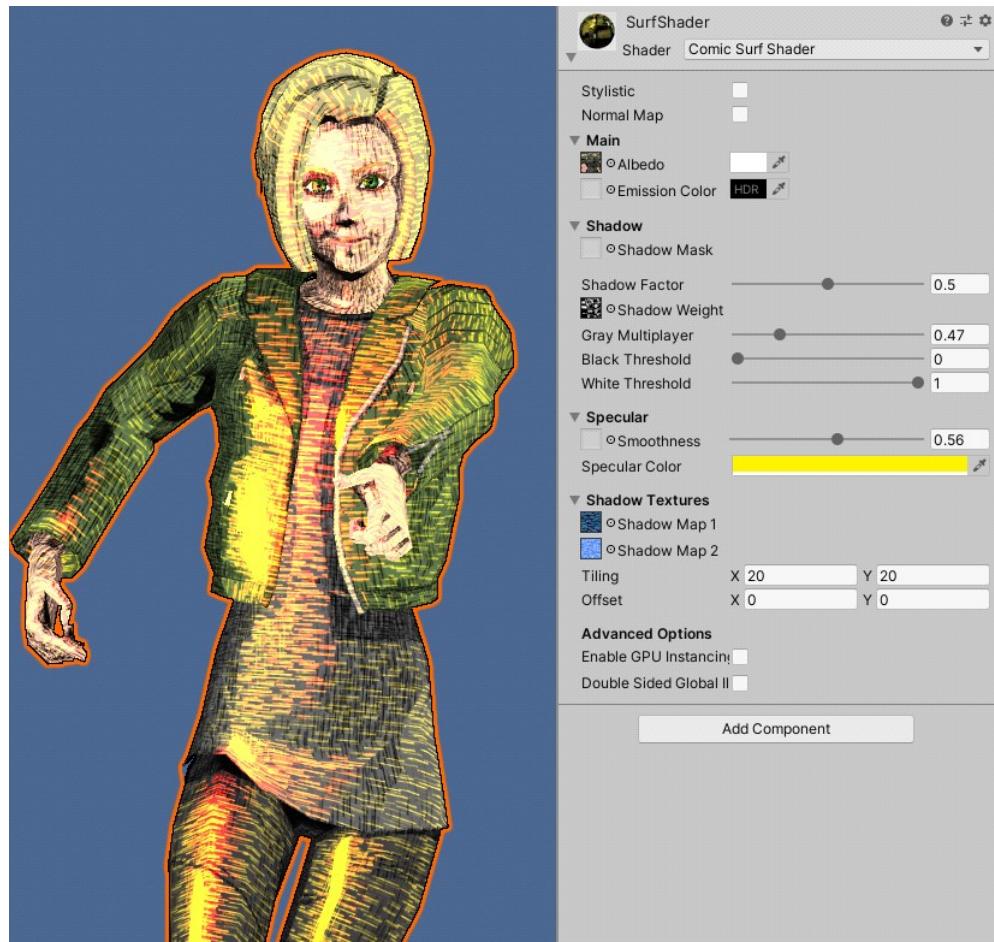
-Specular colors are added with shadow texture.



- Full R, G, B colors for specular are shown as black and only reflect on white surfaces, it is a somehow of a bug I couldn't find a way around in shader. A way around for this is not using maximum saturation for these colors.



-Point/Spot light specular colors can come on top of Specular reflection of material.

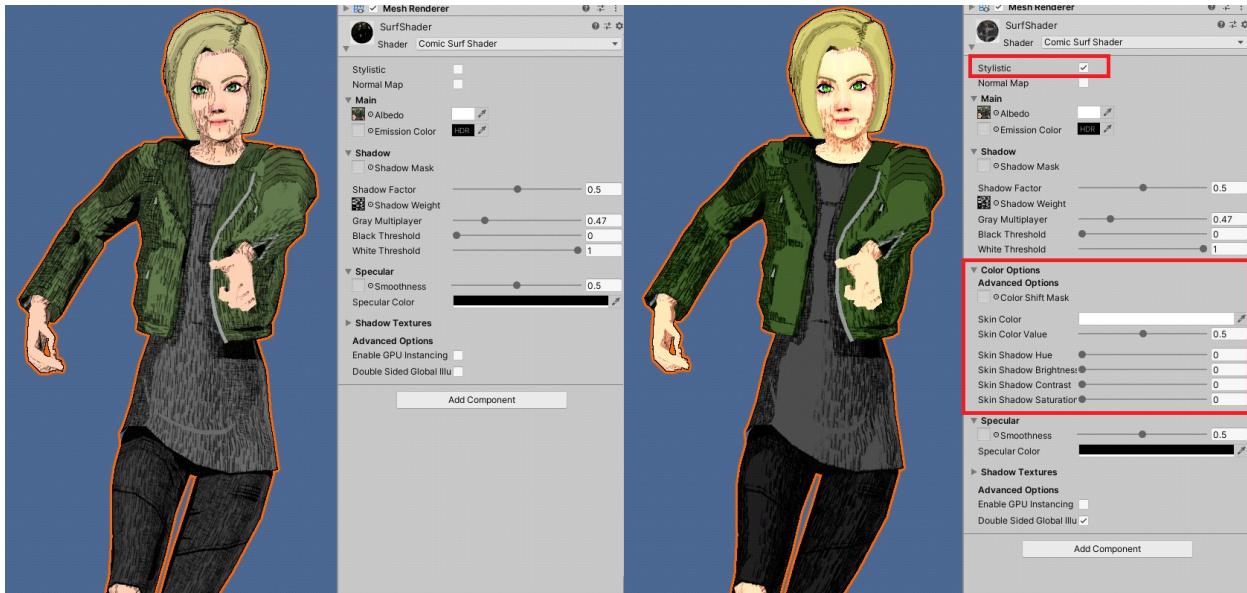


## Stylistic

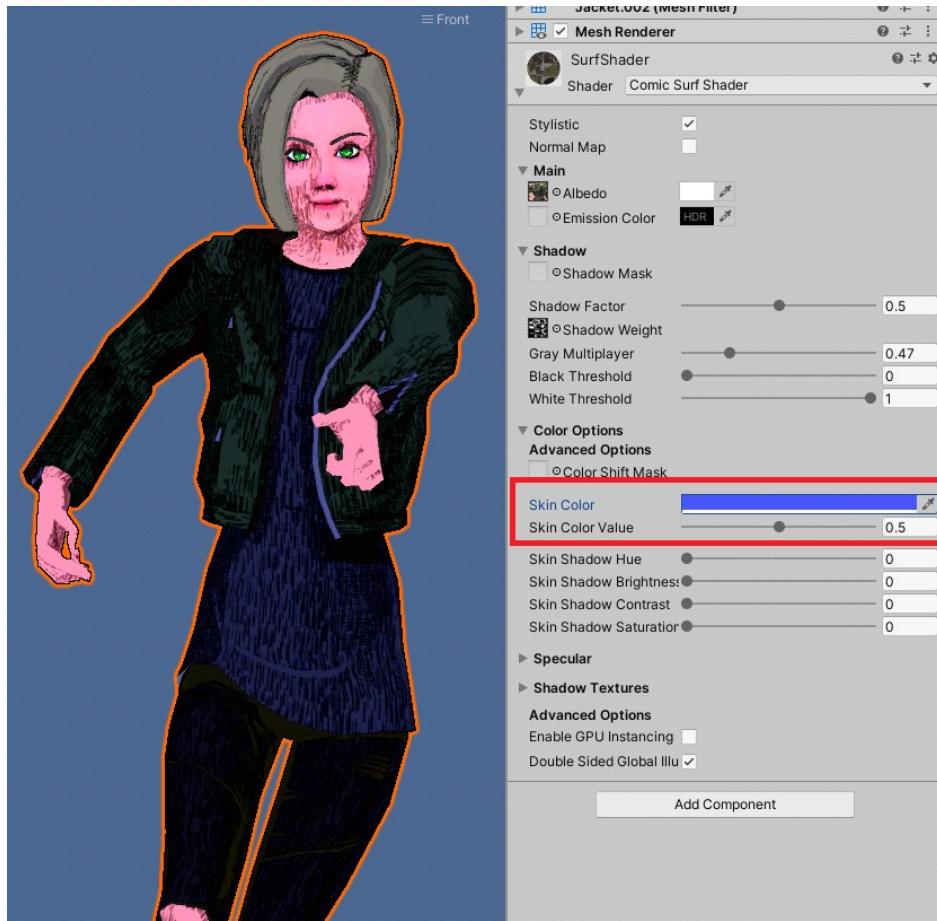
Again let's remove point light and leave Smoothness around 0.5 and make Specular Color black to avoid distraction.

This options is quirky and somewhat hard to use .

Now let's click Stylistic. After clicking it, colors will look burned which is normal. Because that color is applied with a burn function according to skin color value.



For now let's pick a Base Color and make Skin Color Value 0.5 .



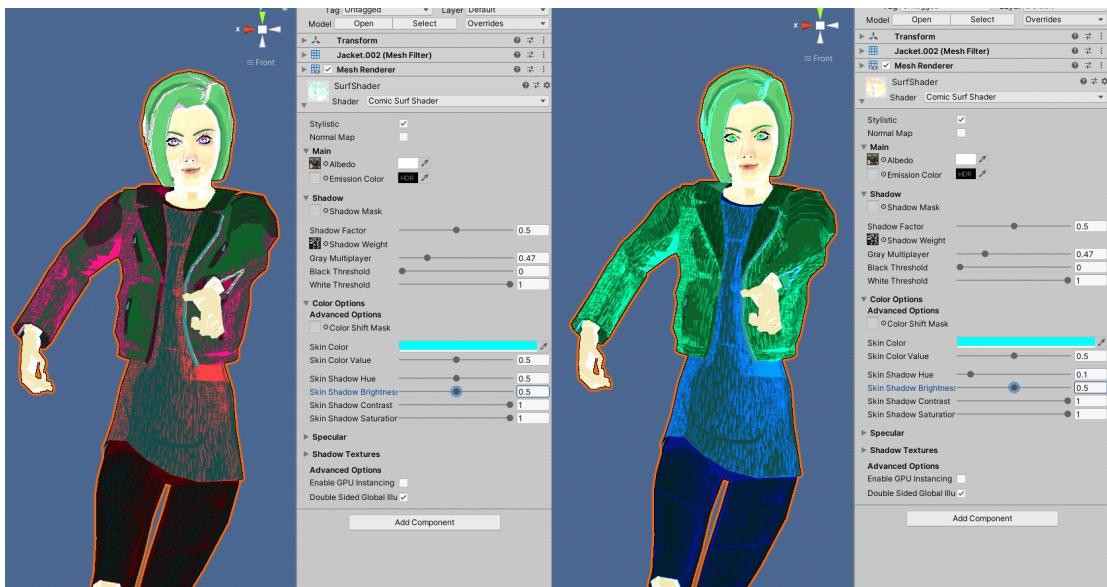
4 sliders under Skin Color Value controls shadow color properties.

Color of shadow is calculated after skin color and burn is applied. You change this color with hue. Because of this each different colored place of material will have a different shadow color. This way you can't change the shadow color the way you want precisely but shift the hue (Subjectively I thought this would be more practical and useful but there are few inconsistencies involved).

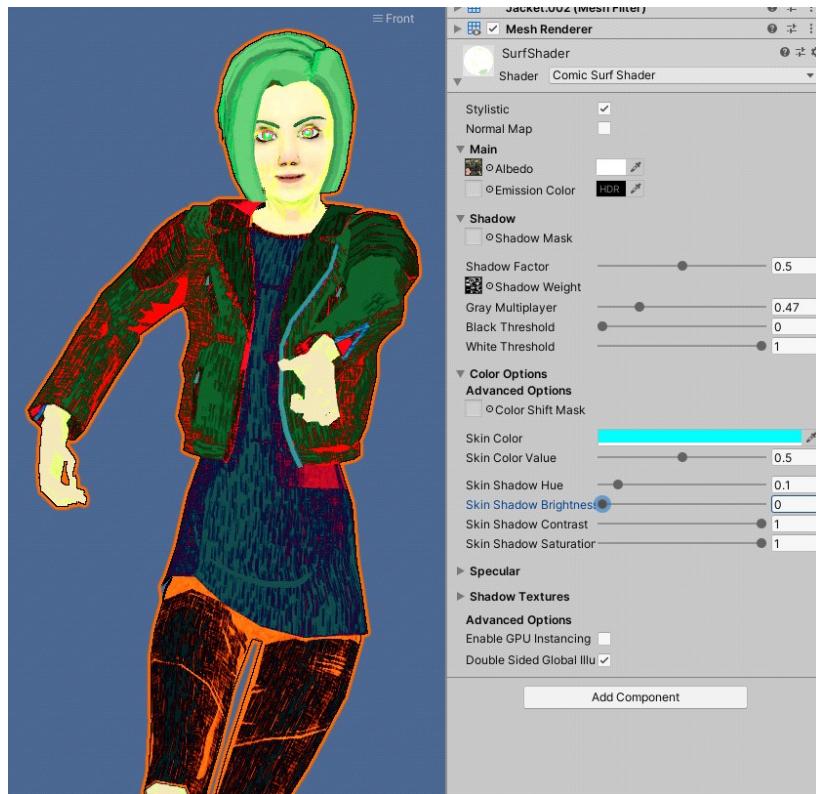
For example:

Skin Shadow Hue at 0.5 will make shadow colors complementary, so all shadows in this material will create strong color contrast.

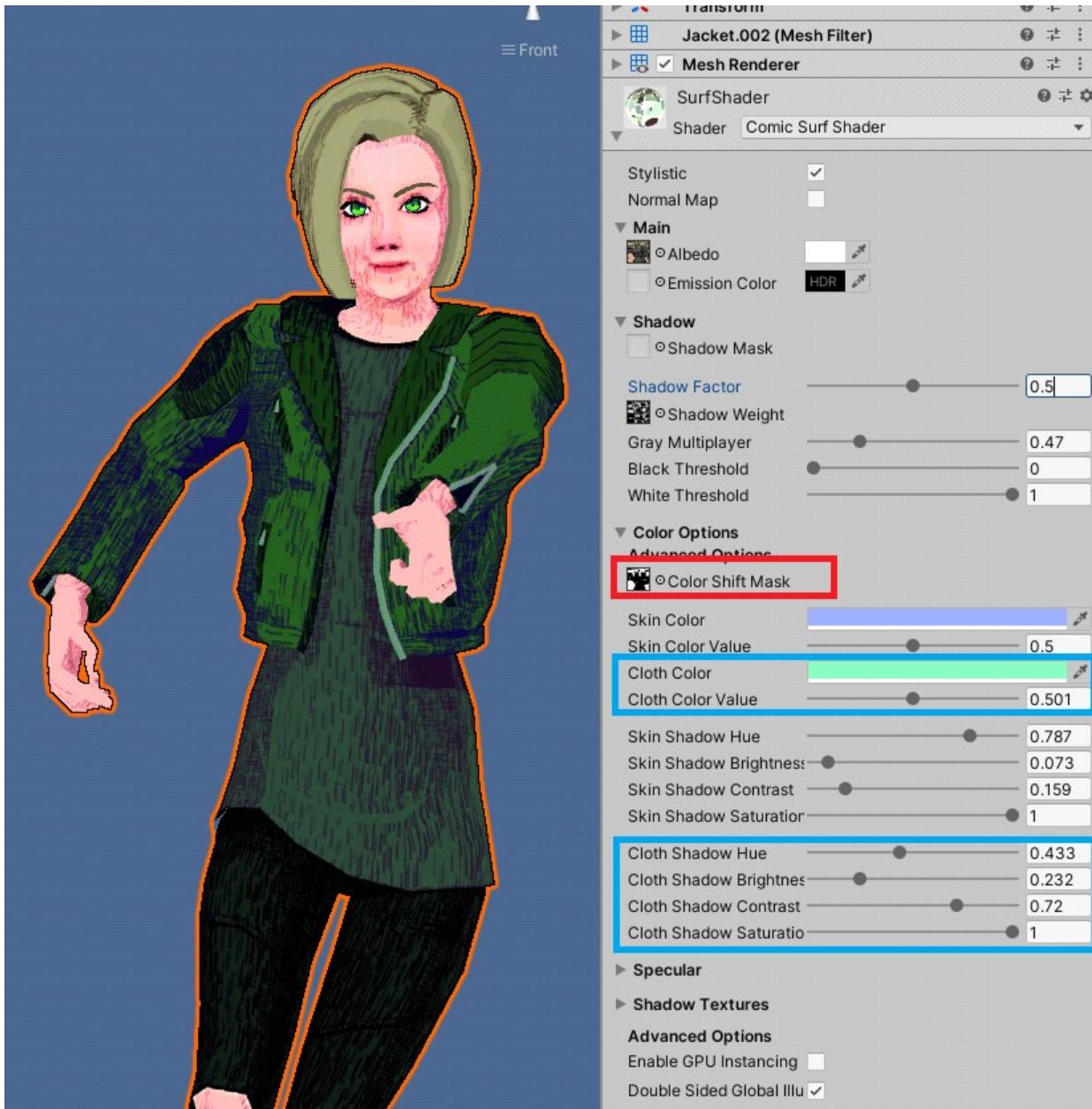
Skin Shadow Hue at 0.1 will make shadow colors shift their color and won't make a big color difference.



That being said this system is not really consistent you can get colors similar to complementary just by lowering brightness too. It needs fiddling around a lot to find a nice setting. Also there is another problem with it. Light colored parts like skin and it's shadow has a similar value they are not apparent.

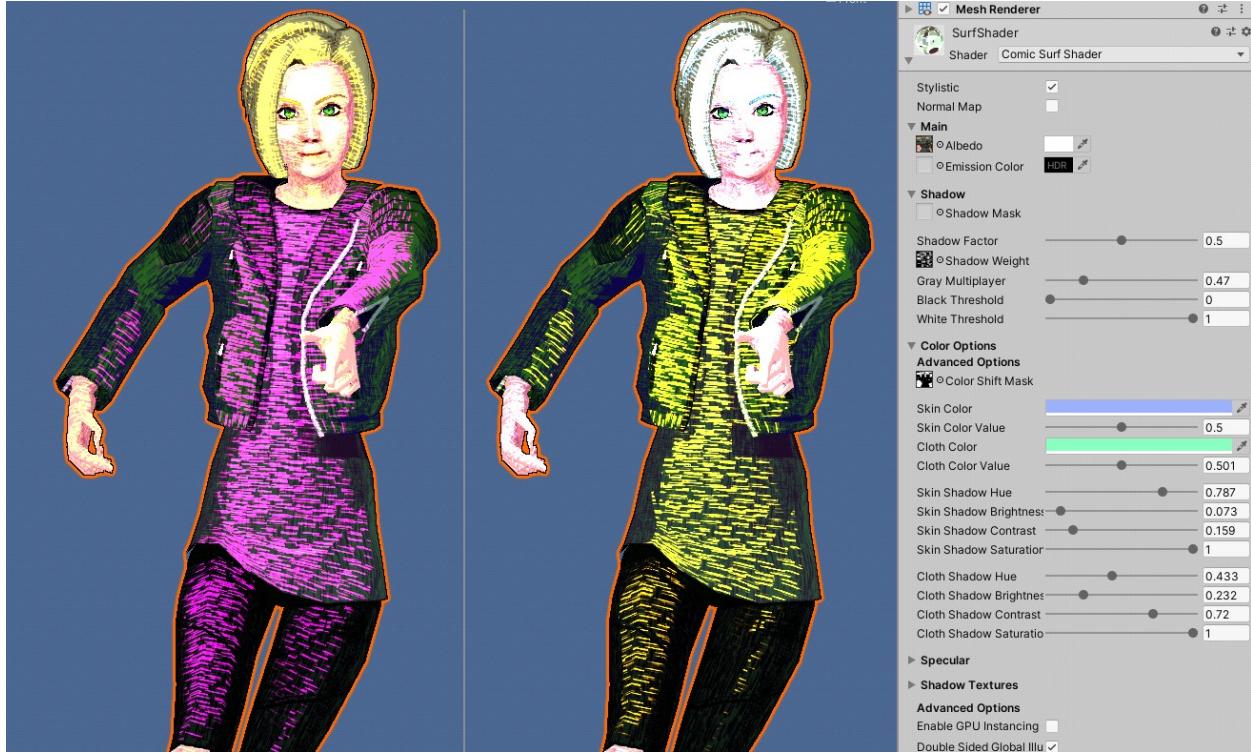


That can be solved with Color Shift Mask also you can use it just to change a part of the material's color. After adding a black and white mask texture you will automatically get a new set of properties to change color setting of these areas differently.



One last thing about this is, this new changed shadow color also changes color of specular/point lights.

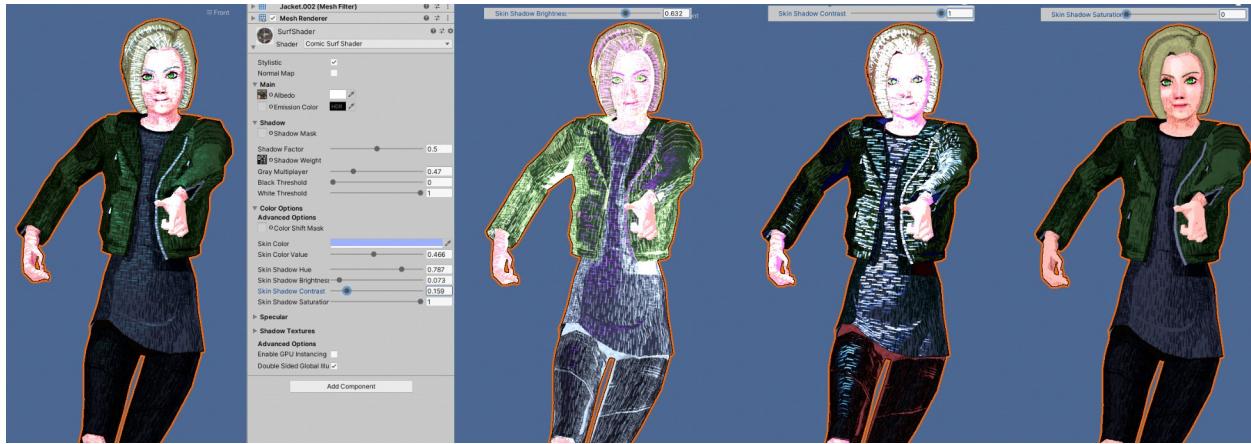
Left one has blue point light and right one has red point light. Specular color for these lights change their color according to Shadow Hue slider.



Brightness increase/decrease brightness of shadow colors.

Contrast will make lighting specular more apparent, also change it if it is more than 0.5.

Saturation works as expected but works also for lighting specular.



Over all stylistic part of shaders is a little inconvenient, inconsistent and has weird color interactions. But still may help you prototyping or give you interesting options time to time if you like fiddling around.